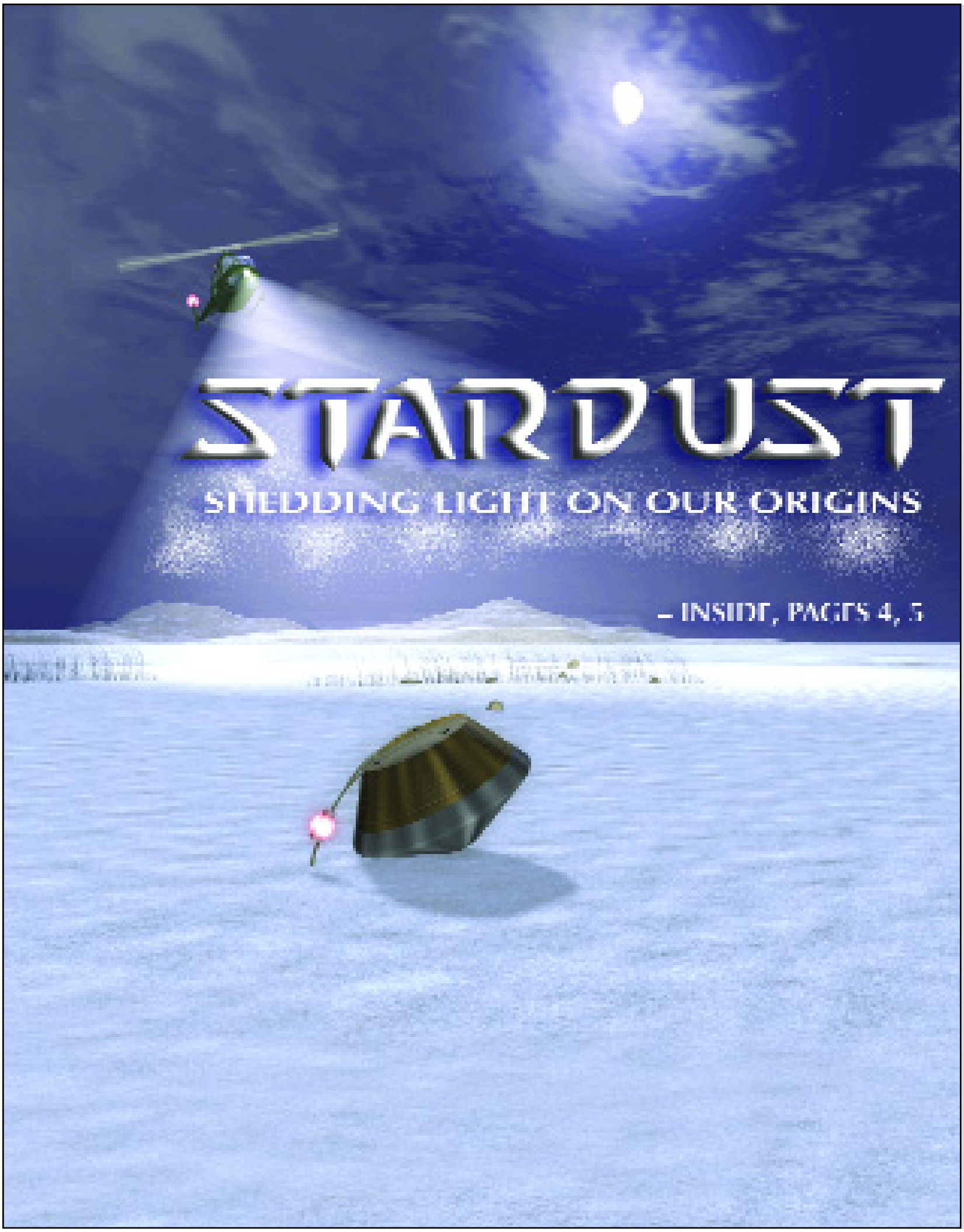
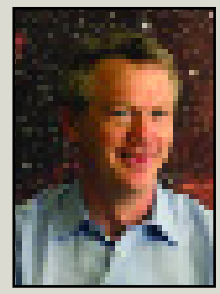
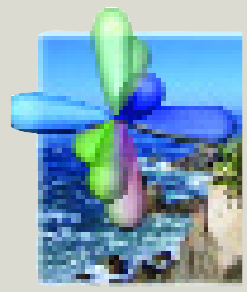
NEWSLINE

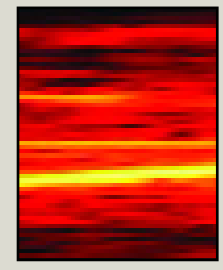
Published for the employees of Lawrence Livermore National Laboratory | January 20, 2006 | Vol. 31, No. 2



WHAT'S **INSIDE**







LABORATORY NEWS

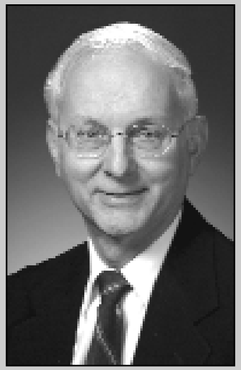
Wayne Shotts announces his retirement

Wayne Shotts, deputy director for Operations, has announced plans to retire from the Laboratory, effective March 1.

Shotts has led the Laboratory's operational programs since January 2005, and his career spans more than 31 years of work in physics, defense and nuclear technologies, nonproliferation, arms control, international security and homeland security.

"I have thoroughly enjoyed my tenure at Livermore," Shotts said. "The Lab is a terrific place to work and I am proud of the technical and scientific accomplishments we've made on behalf of the nation."

For the past year, Shotts has managed all institutional operations at LLNL with responsibilities for such areas as safety, security, facility management and Laboratory business practices. He was named acting deputy director in October 2004, assuming the permanent position in January 2005. Prior to that, Shotts had a successful tenure as the first director of the Laboratory's Homeland Security Organization and as associate director of Nonproliferation, Arms Control and International Security (NAI) for nine years.



Wayne Shotts

"I regretfully accept Wayne's resignation," said Michael Anastasio, LLNL's current director and the incoming director of Los Alamos National Laboratory. "Wayne has been a trusted colleague, an outstanding scientist and a friend. His commitment to Livermore has been unwavering and he will be missed. I want to thank him for this dedication and I wish him well."

Shotts has been serving as acting director of LLNL since the announcement of the Los Alamos National Security, LLC (LANS) contract win for the management and operations of Los Alamos National Laboratory and the departure of Anastasio to lead the LANS team. Under Laboratory protocol, the deputy director of operations assumes leadership for the Laboratory when the director is absent or traveling.

Shotts joined LLNL in 1974 as a physicist. He has served as a group and program leader in the Lab's nuclear design department and division leader for nuclear chemistry and prompt diagnostics. In 1988, he became principal deputy associate director for military applications. In 1992, he joined the Defense and Nuclear Technologies Directorate as principal deputy. In 1995, he was named associate director of NAI. Following the tragedy of September 11, 2001, the Laboratory formed a new Homeland Security Organization and Shotts assumed leadership.

Shotts received his bachelor's degree in physics from UC Santa Barbara in 1967. He received a Ph.D in physics from Cornell University in 1973. In 1990, he was awarded the E.O. Lawrence Award for National Security for his contributions to the research and development of advanced nuclear weapons and his innovative approach to improving diagnostic methods, which have aided in solving some of the most pressing problems in nuclear explosive designs.

Shotts is a longtime member of the American Association for the Advancement of Science and the American Physical Society. His research interests include applied optics, nuclear chemistry, electromagnetics, plasma physics, weapons effects, arms control and nuclear policy. He has participated in numerous panels and studies on national security, nonproliferation and counterterrorism. Shotts lives in Livermore with his wife, Jacquelyn.

DOE/NNSA launch the process to compete the contract to manage and operate the Lab

The Department of Energy has initiated the process to compete the management and operating contract for the Laboratory for the first time since LLNL's creation on Sept. 2, 1952.

The National Nuclear Security Administration announced that parties interested in competing for the contract should submit an expression of interest (EOI) that describes their capabilities. The NNSA is preparing a request for proposal (RFP), including the draft contract terms and conditions, that is tentatively scheduled for release by summer 2006.

A Website, http://www.doeal.gov/llnlCompetition, has been established for the dissemination of all information related to the competition. The Website will identify when the EOI is due to the NNSA's Service Center in Albuquerque, NM. A subscription feature is included on the Website, which enables interested parties to receive a notice whenever the website is updated. The Website will be the principal distribution medium for notices, changes, questions and answers and the forthcoming RFP.

The RFP release date will be announced through the Website. Any amendments to the RFP or other pertinent information relating to the acquisition also will be available on the Website. Additionally, NNSA will share draft sections of the RFP for public comment as they become available in order to streamline the procurement process and initiate industry comments and recommendations.

JACQUELINE MCBRIDE/NEWSLINE

Celebrating Martin Luther King Jr.

On Thursday, the Lab held its annual Martin Luther King, Jr. celebration with keynote speaker Terrence Roberts of the Little Rock Nine Foundation. Roberts, second from left, congratulates one of this year's Martin Luther King Jr. essay award recipients Caitlin Beach and parents Linda and Rex Beach. The event was sponsored by the Director's Office, AHRD and Work-Life Center.

SCIENCE NEWS

Technique makes carbon nanotubes more durable

By Anne M. Stark
Newsline staff writer

Carbon nanotubes used in electronics such as cell phones might have a longer life thanks to a strengthening technique pioneered by researchers at the Laboratory, Boston College and Massachusetts Institute of Technology.

By heating a single-walled carbon nanotube to more than 3,600 degrees Fahrenheit, the nanotube became nearly 280 percent stronger than it was in its original form and its diameter shrunk by 15 times. The discovery has implications in strengthening ceramic and other nanocomposites at high temperatures and is useful in tuning electronics.

"The super-strain we discovered can be used to tune the electronic properties of carbon nanotubes for their applications in microelectronics," said Yinmin (Morris) Wang, of the Lab's Materials Science and Technology Division and a co-author of the paper that appears in the Jan. 19 edition of the journal *Nature*. Wang also is an important member of the recently established Nanoscale Synthesis and Characterization Laboratory in the Lab's Chemistry and Materials Science Directorate.

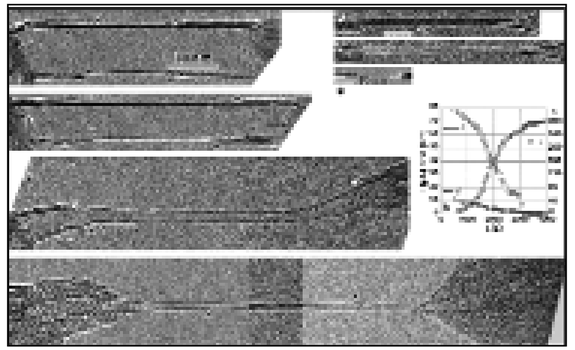
Carbon nanotubes are 10,000 times smaller than a human hair and are used in a variety of machines including computers, cell phones and personal handheld devices.

A typical carbon nanotube can be stretched to 15 percent longer than its original length before it fails. But in the high-temperature experiments, the heated nanotube was able to stretch to more than 280 percent of its original length before it broke.

Researchers took a 24-nanometer piece of nanotube and stretched it to 91 nanometers before it failed, while the diameter was reduced by 15 times from 12 to 0.8 nanometers.

"This kind of intense stretching and reduction in diameter in a carbon nanotube is unprecedented," Wang said. "This super-elongation is due to a full plastic deformation that occurs at high temperatures."

Under such high temperatures, the nanotube appears to be completely pliable, resulting in a superplastic deformation that would otherwise be impossible at low temperatures.



A single-walled carbon nanotube of 75 nanometers can stretch to 84 nanometers before it breaks. New calculations show that by heating the nanotube to more than 3,600 degrees Fahrenheit, it became nearly 280 percent stronger than it was in its original form and its diameter shrunk by 15 times.

"Our surprising discovery of superplasticity in nanotubes should encourage the investigation of their mechanical and electronic behavior at high temperatures," Wang said. "The tubes may find uses as reinforcement agents in ceramics or other nanocomposites for high-temperature applications."

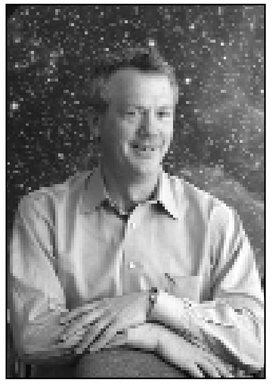
In addition to Wang, other co-authors of the paper include J.Y. Huang and S. Chen of Boston College and M.S. Dresselhaus of MIT.

DDLS: 'A Blunder Undone: Albert Einstein and the Accelerating Universe'

Astronomer Robert Kirshner of Harvard University will discuss "A Blunder Undone: Albert Einstein and the Accelerating Universe," at 3:30 p.m. Tuesday, Jan. 24, in the Bldg. 123 auditorium. The talk is a Director's Distinguished Lecturer Series presentation and all employees are invited.

In 1917, Einstein amended his original equations for general relativity by introducing a cosmological constant to make a static universe. However, after the discovery, in 1929, that the universe was expanding, this cosmological term looked like a big mistake. In fact, it is often referred to as Einstein's greatest blunder.

Moreover, modern astronomical observations made using exploding stars show that not only is the universe expanding, but this expansion is accelerating. This remarkable finding is attributed to the effects of a mysterious "dark energy" that pervades the universe.



Robert Kirshner

Although its nature is not well understood, dark energy has properties very much like the cosmological constant and is thought to make up two-thirds of the universe's energy density.

Observations from the Earth's surface and from the Hubble Space Telescope are now under way to determine the nature of the dark energy, one of the deepest mysteries in physical science.

Kirshner is a Harvard College professor of astronomy and Clowes professor of science at Harvard University. Kirshner has authored more than 200 research papers dealing with supernovae, the large-scale distribution of galaxies and the size and shape of the universe. His work on the acceleration of the universe was dubbed the "Science Breakthrough of the Year" by *Science* magazine in 1998.

He was elected to the National Academy of Sciences in 1998 and the American Philosophical Society in 2005 and currently is president of the American Astronomical Society. His popular book "The Extravagant Universe: Exploding Stars, Dark Energy, and the Accelerating Cosmos," won the 2002 Association of American Publishers Award for Best Professional/Scholarly Book in Physics and Astronomy, and has been translated into several languages.

Kirshner graduated from Harvard College in 1970 and received a Ph.D. in astronomy from the California Institute of Technology in 1975. After nine years on the University of Michigan faculty, he returned to Harvard in 1986, serving as chairman of the Astronomy Department from 1990 to 1997. From 1997 to 2003, he was an associate director of the Harvard-Smithsonian Center for Astrophysics.

The presentation will be rebroadcast on Lab TV channel 2 Thursday, Feb. 2, at 10 a.m., noon, 2, 4 and 8 p.m., at 4 a.m. on Friday, Feb. 3.

Mission to understand the origins of life gathers stardust

By Anne M. Stark
Newsline staff writer

A speck of dust smaller than the human eye can see and from a place so far away humans haven't even ventured there may reveal clues to the birth of our solar system.

By tailing a comet — serendipitously called Wild 2 — that was shooting materials out at 6.1 kilometers per second, the Stardust spacecraft managed to pick up cometary and interplanetary dust particles that contain the very iron that is found in every human being's hemoglobin and may provide hints to how life started on Earth.

"It's dirt," said John Bradley, director of the Laboratory's Institute for Geophysics and Planetary Physics. "Basically, it's cosmic crud."

But that cosmic crud found in deep space also makes up most of the content within the human body. And it arrived on Earth from the Stardust spacecraft's seven-year mission just before 2 a.m. Sunday, Jan. 15, in the middle of a Utah desert. The sample return capsule (SRC) touched down at the correct velocity (10 mph), bounced five times, and then released the chute. The chute settled to the ground about 30 feet away.

"The landing surface was a smooth, dry mud-flat with a somewhat surreal appearance," Bradley said after the landing. "Everyone involved is elated but exhausted."

A comparison of the amount of dust gathered on the two-year mission: The Apollo moon missions brought back about 280 kilograms of material; on Stardust, less than a milligram of material will be returned.

Bradley is one of nearly 150 scientists of an international team that will dissect the dust particles collected in a tennis-racquet-shaped collector engulfed in aerogel. Aerogel — which is a material that is made up from 99.8 percent air, provides 39 times more insulation than the best fiberglass insulation, and is 1,000 times less dense than glass — was used to ensure the samples would stay intact as the capsule slammed into Earth at 29,000 miles per hour.

Other Livermore team members include Giles Graham, Hope Ishii, Zurong Dai, Sasa Bajt, Patrick Grant, Ian Hutcheon, Jerome Aleon and Nick Teslich.

The analysis is a very detailed and precise exercise in which some tracks will be carved out of the aerogel with ultrasonic diamond blades (developed at the Lab). Scientists will then use microscopic needles to extract the dust from the tracks.

"We do something not unlike a colonoscopy with the tracks," he said.

After Sunday's early landing, Bradley said the capsule's heat shield was in excellent condition, which bodes well for the contents of the SRC. It was flown to NASA'S Johnson Space Center in Houston on Tuesday where the capsule was opened that evening. The first few days were devoted to optical scanning of the aerogel tiles. Extractions of particles from aerogel cells will likely begin next week.

"It's unbelievable. It's almost surreal," Bradley said. "We've collected so much stuff. We can see it. With a needle and a spatula, I could put it on the tip of my fingernail."

LLNL/IGPP personnel performed some of the first extractions at NASA-JSC using the ultrasonic diamond-microblade technology developed at LLNL.

"We may receive samples at LLNL as early as next week," Bradley said.

Livermore researchers will use the Laboratory's transmission electron microscope and NanoSIMS — the nanometer-scaled secondary-ion mass spectrometer — to analyze the mineralogy, chemical and isotopic composition of the dust particles.

"This can help us understand where and when the particles formed," Bradley says.

There is even talk that some of the material from Stardust may point to clues about how life started on Earth. Because planets change over time — they are constantly breaking down molecularly — they are practically futile for scientists who are trying to understand how our solar system formed.

Comets, however, live mostly at extreme distances from the sun, some of the coldest and furthest reaches in the solar system, making them a virtual refrigerator for storing the original ingredients of the system's formation.

Bradley said he could see the actual tracks of cometary dust within the aerogel.

"My gut feeling is that there will be a lot of carbonaceous material. That is incredibly exciting because that means we can do organic chemistry. These fragments also contain multiple impact tracks and they will be easy pickings for rapid harvesting of 'treasure' by anyone with a steady hand."

Our solar system formed — about 4.6 billion years ago — and around 3.5 to 4 billion years ago something "kicked the origin of life off real quickly on Earth soon after and the heavy bombardment by comets and chunks of asteroids subsided," Bradley said. "The organic precursors of life may have just come from a comet.

"This same dust that was inherited from the galaxy into the early solar system makes up all the atoms in your body. We're in this same interstellar dust."

Stardust is a part of NASA's series of Discovery missions and is managed by the Jet Propulsion Laboratory. Other collaborators include the University of Washington; Lockheed Martin Space Systems; Boeing Co.; Max Planck Institute for Extraterrestrial Physics; NASA Ames Research Center; and the University of Chicago.

Stardust launched in February 1999 and set off on three giant loops around the sun. It began collecting interstellar dust in 2000 and met Wild 2 in January 2004, when the spacecraft was slammed by millions of comet particles, nearly halting the mission. But Stardust survived and has brought some of the tiniest of those particles back to Earth.

Stardust is the first craft to safely make it back to Earth with interstellar dust particles intact. In 2001, the Genesis spacecraft was launched and flew about 1 million miles from Earth and collected particles from solar winds for 850 days. However, upon its return to Earth, the capsule spun out of control and its parachute never opened. The probe crashed into the Earth at 100 mph.

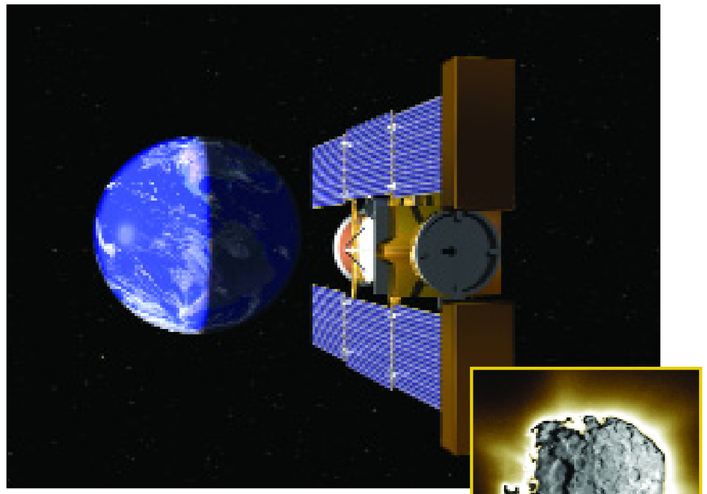
Scientists have collected thousands of meteorites and cosmic dust particles on Earth, but with few exceptions, the exact source of those materials cannot be positively identified. With the Stardust samples, scientists are starting a new chapter in astronomy.

And what lies inside that capsule may just help humans understand what it all means.

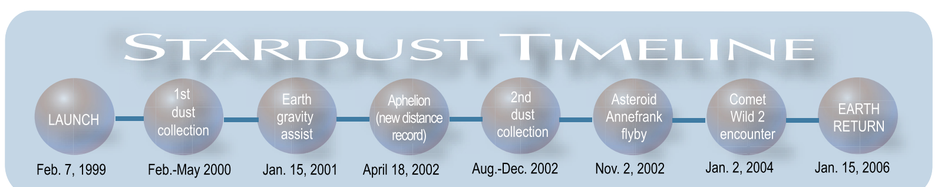
"This may help tell us where the stuff we are made of came from" Bradley said "The Stardust mission has been a stunning success, far exceeding even our most optimistic expectations. Now, we begin the arduous task of photo-documentation, followed by years of great science."

John Bradley, director of the Lab's Insitute for Geophysics and Planetary Sciences, gives a thumbs up Tuesday from the Johnson Space Center in Houston after viewing bits of cometary dust in the aerogel that returned to Earth on board the Stardust spacecraft. Stardust's capsule returned to Earth on Sunday after a seven-year mission to pick up cometary and interstellar dust.

Researchers at the Johnson Space Center take close-up photographs of the aerogel panels that were aboard the Stardust spacecraft. Inset, impact from comet Wild 2 in an aerogel fragment removed from the canister base plate.



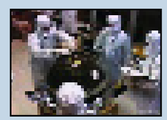
Top, an artist's rednering of the Stardust spacecraft. The panels on both sides are filled with aerogel that captured millions of cometary and instellar dust. Right, this composite image was taken by the navigation camera during the close approach phase of Stardust's Jan. 2, 2004 flyby of comet Wild 2. Several large depressed regions can be seen. Comet Wild 2 is about five kilometers (3.1 miles) in diameter. The image shows an intensely active surface, jetting dust and gas streams into space and leaving a trail millions of kilometers long.



STARDUST FACTS

- Stardust is the first U.S. mission launched to robotically obtain samples in deep space and return them to Earth.
- Stardust is the first NASA mission dedicated to exploring a comet.
- Comets contain many of the organic materials thought to be essential for the origin of life.
- In the early solar system, comets bombarded the planets constantly.
- The space object that struck Earth 65 million years ago, causing the dinosaurs to become extinct, may have been a comet.
- Comet Wild 2, the destination of Stardust, almost collided with Jupiter in 1974, causing its orbit to be deflected closer to the sun.

- The Stardust spacecraft passed comet Wild 2 at 13,000 mph, over six times faster than a speeding bullet.
- Comet particles — that are smaller than the diameter of a human hair — were captured using a material called aerogel.
- Comet particles made carrot-shaped tunnels in the aerogel as they stopped. At the pointed tip of each tunnel a tiny particle will be found.
- Less than one-thousandth of an ounce of cometary dust was collected.
- The spacecraft traveled 2 billion miles to meet comet Wild 2, and another 1 billion miles to get back home.



- During its seven years in space, the Stardust spacecraft raced along at an average speed of 48,000 mph.
- The return capsule re-entered Earth's atmosphere on Sunday, Jan. 15, at 2:45 a.m. Mountain Time and parachuted in at the Utah Test and Training Range.
- In terms of distance from the sun, Stardust traveled well beyond Mars and over half the distance to Jupiter.
- The Stardust capsule hit the Earth's atmosphere at 28,000 mph faster than the Apollo mission capsules and 70 percent faster than the re-entry velocity of the space shuttle.
- Stardust is the first U.S. mission designed to return samples from another body since the Apollo missions to the moon.

LABORATORY NEWS

Labs to host plutonium conference

By Anne M. Stark
Newsline staff writer

The Laboratory in collaboration with Los Alamos National Laboratory is hosting the Plutonium Futures — The Science 2006 conference this year.

The conference provides an international forum for presentation and discussion of current research on physical and chemical properties and environmental interactions of plutonium and other actinide elements.

"This is a unique conference," said Michael Fluss of the Chemistry and Materials Science Directorate and the chair of this year's conference, fourth in a series. "It is focused on the science of plutonium and the actinides. We need to increase our understanding of the science and technology of plutonium in all relevant areas and a conference like this helps generate new ideas.

"Plutonium is not something we want the scientific community to ignore," he said. "But it exists; it's real, and we have to deal with it both in terms of its extraordinary scientific and technical challenges."

The conference will provide opportunities to examine present knowledge of the chemical and physical properties of plutonium and other actinides in complex media and materials; to discuss the current and emerging science (chemistry, physics, materials science, nuclear science, and environmental effects) of plutonium and actinides relevant to enhancing global nuclear security; and to exchange ideas.

About 350 international researchers from more than 60 institutions and 18 countries attended the third conference, held in 2003. The conference provides a forum for illustrating and enhancing capabilities and interests, and assessing issues in these areas.

United States and international scientists, engineers, faculty and students from universities, national laboratories and the Department of Energy's nuclear complex are encouraged to participate and make technical contributions.

Fluss said researchers often bring new ideas and techniques for plutonium.

"This conference puts options on the table and society makes the decision," Fluss said. "This is an opportunity to learn about plutonium and the actinides, and you don't have to go to Europe."

The conference is open to all and will be held July 9-13 in Pacific Grove. The abstract submission deadline is Feb. 15. Supporting letters for graduate students, postdoctoral and young investigator assistants are due to Fluss by March 1. The deadline to register for the conference is May 15.

There will be a half-day introductory tutorial session on actinide science for students, non-specialists and other interested parties on the afternoon of Sunday, July 9, before the official start of the conference. The extended abstracts will be available online and at the conference.

For more information, visit the Web at http://www-cms.llnl.gov/pu2006/.

inbrief

Coffee and food services to close at the South Cafe

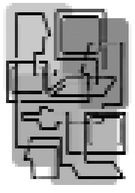
Effective Tuesday, Jan. 31, all food and coffee services will end in the South Café. Changes in site access, population decreases in the south mall region and the opening of the new Central Café have all led to decreased sales at the South Café. The West and Central cafés are available for food and coffee services. The Java Wave gourmet coffee stations at both the West and Central cafés are open 7 a.m. to 2:30 p.m., Monday through Friday.

During the hours of 9:30 to 11:30 a.m., the West and Central cafes now offer a grab and go service consisting of pastries, premade sandwiches, salads, snacks and beverages. Full service lunch will be served as usual from 11:30 a.m. to 1:30 p.m. In order to keep the food service available into the early afternoon, the Central Cafe Java Wave gourmet coffee station is selling a selection of sandwiches, salads and beverages from a grab and go cooler from 1:30 to 2:30 p.m.

Classified ads on hiatus

Newsline and online classified ad services have been temporarily suspended to allow for the transition to a new system. The old Web-based classified ad system has been shut down. *Newsline* is looking at options for an easy to use and cost-effective system that meets Laboratory business standards and requirements. Look for updates in *NewsOnLine*.

Ergonomics program refocuses, seeks directorate partnerships



Hazards Control has refocused its Ergonomics Program, emphasizing increased partnering with directorates on ergonomic matters. The refocusing, says Laboratory ergonomist Melanie Alexandre, is in line with institutional "belt tightening."

"Our institutional ergonomics program basically remains intact as we attempt to adjust to constrained resources," said Alexandre. "What changes in this period of tight budgets is the way ergonomic services will be provided."

Alexandre emphasized that as Hazards Controls' ergonomics lead, her job is to be a "knowledge resource" to directorates, which have the prime responsibility for meeting the needs of their employees.

As an example of how ergonomics partnering will work, Alexandre points to changes involving the Ergonomics Demonstration Room, located in Bldg. 255. The room houses an assortment of ergonomic chairs and accessories such as pointing devices, keyboards, keyboard trays and document holders.

In the past, Hazards Control was the focal point for making demo room appointments and providing chair fitting and accessory selection services. "Now we need to rely more on ergo evaluators across the Laboratory," said Alexandre.

Under a new procedure, ergonomic evaluators will schedule appointments with their clients for access to the Ergo Demo Room and help them select appropriate chairs and accessories.

Staffing issues also are having an effect on 2-ERGO (2-3746), the telephone hotline employees call when they have an ergonomics issue and don't know where to get help.

Employees calling 2-ERGO will be able to leave a message and have their call returned within days, instead of 24 hours as had been the case.

And 2-ERGO callers seeking help with a routine ergonomic evaluation or information on available ergonomic resources will be directed to the Ergonomics Website (http://www. llnl. gov/ergo/). Recently, Alexandre updated the directorate point-of-contact list for ergonomic evaluations and posted it to the Ergonomics Website.

As another way of helping 2-ERGO callers, Hazards Control pre-programmed the hotline so calls can be directed to appropriate resources. Callers experiencing discomfort will be directed to Health Services; those with furniture or related work station concerns will be directed to Furniture Services.

Another change in the Laboratory's ergonomics program involves computer eyeglass services. Although ergonomic evaluators will continue to take eye-related measurements when they do workstation evaluations, the Laboratory will no longer provide prescription glasses for computer users. Instead, employees will need to take the measurements to their personal optometrists to get computer eyeglasses.

One Labwide ergonomics resource that remains unchanged is the Early Intervention Program (EIP), a joint venture between Hazards Control, Health Services and the directorates that is available to employees experiencing discomfort associated with work activities, whether the cause is work-related or not. The goal of EIP is to intervene as quickly as possible to prevent ergonomic discomfort from turning into injury. Employees needing EIP help may call 4-4496 directly, use the 2-ERGO service, or contact a directorate ergonomics evaluator.

"Hazards Control is committed to continue to work closely with the directorates to keep employees ergonomically safe," Alexandre stressed.

RETIREES' corner

On Nov. 15, Alameda County held a countywide emergency exercise to test response to a weapon of mass destruction (WMD) attack. In the Tri-Valley, the local Radio Amateur Civil Emergency Service (RACES) volunteers for Livermore and Pleasanton were activated and responded to the city's Emergency Operations Centers (EOC). The Laboratory, Sandia and the EOC in Dublin also participated.

Amateur Radio Emergency Service (ARES) volunteers also responded to the Livermore school district offices and the Veterans Hospital. Twenty-plus LLNL amateur radio operators participated, including retirees **Richard Whipkey, Gus Olson, Alan Mode and Richard Hatfield.** Twenty-eight Laboratory employees and retirees volunteer their time and equipment as part of ARES and RACES to serve the local community in case of disaster and for emergency response.

Norma Scarlett (ME, 1997), **Linda Schlinger** (DP, 1997), and **Marian Holten** (EE, 1990) enjoyed a six-day trip to New York. Leaving their Times Square hotel at 6 a.m. most mornings, they enjoyed "Good Morning America," "The Today Show," "Regis and Kelly," the Statue of Liberty, Ellis Island, Empire State Building, Trump Tower, Radio City Music Hall's Rockettes, Rockefeller Center's Christmas tree lighting, New York City Ballet's "Nutcracker," "Lion King" (Spike Lee also attended), "Woman in White," "A Dancer's Life with Chita Rivera," Bloomingdale's, George Jensen Jewelry, Tavern-on-the-Green, Central Park carriage ride, lunch with a Carnegie Hall concert pianist, and sadly, Ground Zero. The trio agreed that a repeat visit is necessary next year.

The **Retirees' Chemistry Group,** (ACS-Aging Chemists' Society) will have a no-host Chinese buffet luncheon on Monday, Feb. 13, at 11:30 a.m. at the Willow Tree Restaurant, 6513 Regional St., Dublin. Cost for the buffet is $12, payable at the door. Spouses and friends are welcome. RSVP by Feb. 6 with the number in your party to **Bob or Anna Lim** (925) 447-3036 or annalim8@yahoo.com. Bring your scrapbooks, pictures and memories.

The travel group meeting is Tuesday, Jan. 24, at 2 p.m. in the Community Room of the Livermore Police building, 1110 S. Livermore Ave. The topic is "Odds and Ends: Baltic Countries, Albania, Andorra, San Marino and Libyan Ruins," by **Arlene and Stephen Chin.**

Send input to Jane or Gus Olson. E-mail: AugustO@aol.com or JaneRubert@aol.com. Phone: (925) 443-4349; snail mail address: 493 Joyce St., Livermore 94550

NEWSLINE

Newsline is published bi-weekly by the Public Affairs Office, Lawrence Livermore National Laboratory (LLNL), for Laboratory employees and retirees.

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Distribution: Mail Services at LLNL

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PEOPLE NEWS

in MEMORIAM

Arthur Babbes

Arthur Babbes died on Jan. 1 after a two-year battle with cancer. He was 81.

Babbes was born in Oakland Feb. 19, 1924. He served in the Merchant Marines from 1945-1957. He worked at the Lab as a refrigeration engineer for 27 years, retiring in 1984.

Babbes was an avid fan and collector of Charlie Chaplin and vintage films from Hollywood's Golden Age. He also loved classical music and at one time played the bassoon for the Oakland Symphony. Active in his later years, he mastered the computer.

Babbes was a lifelong member of the Greek Assembly of God Church in Oakland and spent the last several years as a member of the Businessmen Fellowship.

He is survived by his wife of 51 years, Voula; daughter Rita and her husband Richard Rounke; son Thom and his wife Keri; son Ted and his wife Mahi; siblings Mary Kizanis, Lillie Ann Argyroupoulos and Spiro Babbes; and nine grandchildren.

Services were held in Fremont.

Ken Butterfield

Ken Butterfield died on Dec. 13 after a long illness.

He was born and raised in Martinez, and graduated from Alhambra Union High School in 1952 and East Contra Costa Junior College in 1956.

He worked as a safety engineer at the Laboratory and UC Berkeley. He served in the U.S. Navy as part of Fighter Squadron 701 aboard the aircraft carrier Philippine Seas from 1949-1953.

He retired in 1979. He enjoyed playing golf, gold dredging, fishing and the Feather River Canyon.

He is survived by his wife, Lois Butterfield, and children from a former marriage, Jerry Butterfield of Martinez; Kean Butterfield of Livermore; Allison Butterfield Hurley of Oakland; Scott and daughter-in-law Amanda Butterfield of Pacheco; Adrian Butterfield of Livermore; and Shawn Butterfield of Livermore; stepdaughters Patricia Anderson; and son-in-law Fred Huxley of Berkeley; and Diana Trinner of Murphy. He also leaves 10 grandchildren, as well as his sister and brother-in-law Glenda and Stan Gaunt of Clayton, and many nieces and nephews. He was preceded in death last year by his brother Robert Butterfield.

Memorial contributions can be made to Plumas Community Hospice, P.O. Box 3634, Quincy 95971.

Jack Mitchell

Jack Mitchell, who retired from the Chemistry and Materials Science Directorate in the mid 1990s, died at his home in Tracy Dec. 14 after a battle with pancreatic cancer.

Mitchell was born in Los Angeles Dec. 6, 1932, and grew up in Monterey and San Francisco, where he attended grade school and high school. He served in the U.S. Army during the 1950s.

He attended UC Berkeley in the early 1960s, where he received a doctorate in metallurgy. He then joined the staff at the Laboratory, where he worked for several decades until his retirement.

During his career at the Lab, he contributed to several programs of national importance, including materials for magnetic fusion, national defense and enabling some technologies for SDI.

In addition to working at LLNL, Mitchell and his wife Ruth operated a very popular French restaurant in downtown Livermore for several years.

Mitchell's favorite pastimes included taking his dog Kim Chi for long walks, sailing on his boat with family and friends in the San Francisco Bay, wood working, gardening and reading. He volunteered in the local school system, and was dedicated to bringing the wonders of science to the classroom with clever experiments.

He is survived by his wife Ruth; his daughter Anne; five stepchildren; and four grandchildren.

A memorial service was held in Tracy.

SCIENCE NEWS

Researchers find new way to produce coherent light

By Anne M. Stark
Newsline staff writer

With the exception of lasers and free-electron lasers, there hasn't been another fundamental way to produce coherent light for close to 50 years.

But a group of researchers from the Laboratory and the Massachusetts Institute of Technology have found a new source of coherent optical radiation that is distinct from lasers and free-electron lasers.

Applications for this research are numerous, but the most immediate result may be a new diagnostic tool to determine the properties of shock waves, said Evan Reed, an E.O. Lawrence postdoctoral fellow at Lawrence Livermore and lead author of a paper that appears in the Jan. 13 edition of *Physical Review Letters*.

Through a series of theoretical calculations and experimental simulations, scientists generated a mechanical shock wave inside a dielectric crystalline material, in this case kitchen salt (NaCl). One might expect to see only incoherent photons and sparks from the shocked crystal.

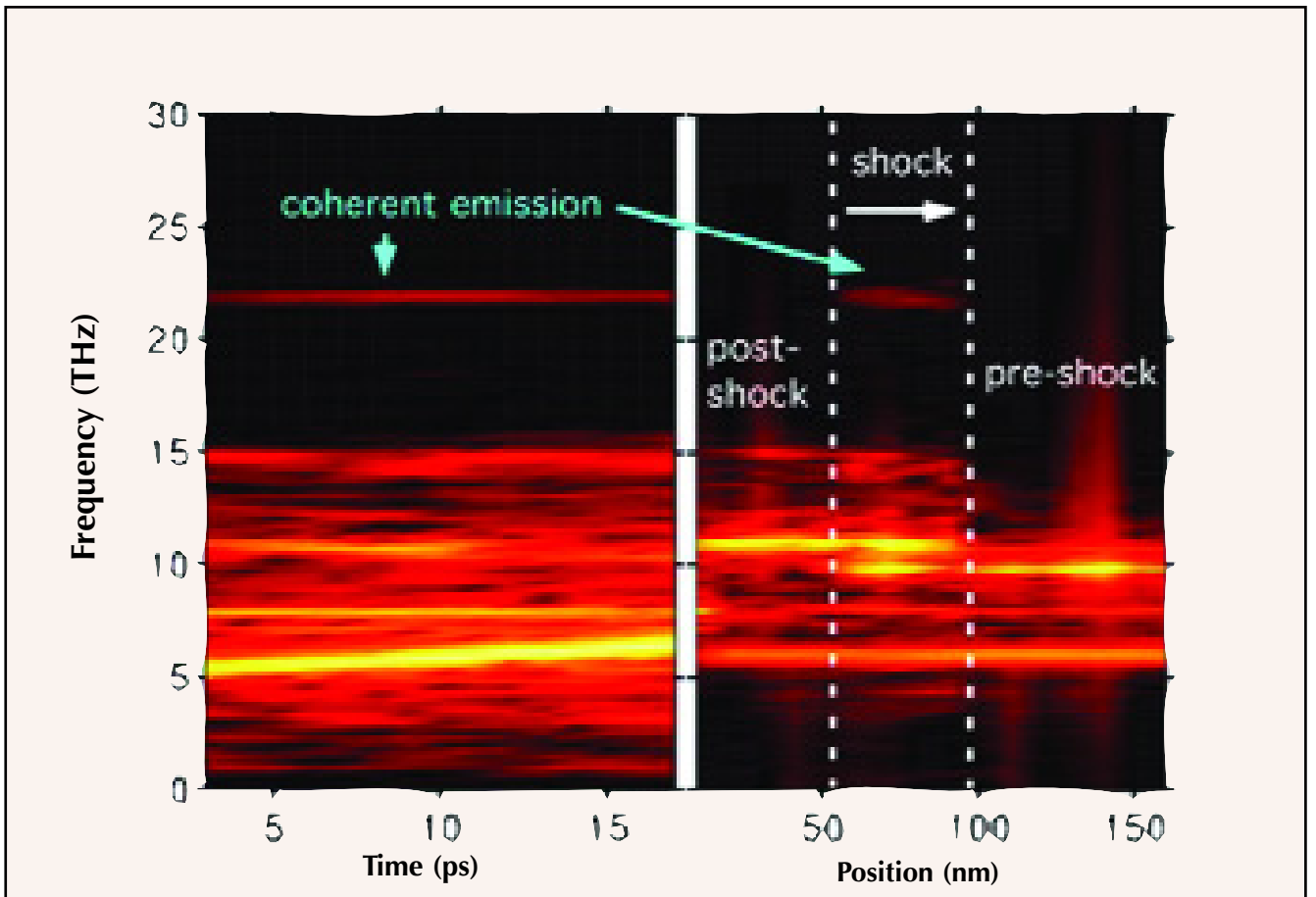
But what they found was so much more. Weak yet measurable coherent light was seen emerging from the crystal. The emission frequencies are determined by the shock speed and the lattice make-up of the crystal.

The team found that measurable coherent light can be observed emerging from the crystal in the range of 1 to 100 terahertz (THz).

"To our knowledge, coherent light never has been seen before from shock waves propagating through crystals because a shocked crystal is not an obvious source to look for coherent radiation," Reed said. "The light and radiation was in a portion of the electromagnetic spectrum that is not usually observed in these types of experiments."

Coherent light is very narrow bandwidth radiation; it is useful for interferometry (the measurement of two or more waves coming together at the same time and place, such as optical and shock waves) and is usually associated with lasers.

The invention of the laser in 1958 as a source of coherent light enabled a wide range of applications including medical technologies and energy production because of the coherence of the light they generate. However, producing coherent light from a source other than a laser can serve as a diagnostic for understanding shock waves, specifically providing information about shock speed and the degree of crystallinity, Reed said.



This figure shows the emission of coherent light at 22 terahertz from a molecular dynamics simulation of shocked NaCl (table salt). The left panel shows the emission of the light as a function of time while the shock is propagating. The right panel shows the generated radiation as a function of location within the shocked crystal indicating the 22 terahertz coherent signal is generated at the shock front (between the white dotted lines).

In the computational experiments, the researchers observed the light generated by a shocked polarized material by performing molecular dynamics simulations of shock waves propagating through crystalline NaCl. The simulations solved the classical equations of motion for atoms that are subject to interaction, thermal effects and deformation of the crystal lattice. The intensive computer simulations were made possible by utilizing LLNL's Thunder parallel computer.

Other Livermore authors include Richard Gee of LLNL's Chemistry and Chemical Engineering Division.

LLNL's Laboratory Directed Research and Development program is funding an experiment to observe coherent radiation in the laboratory. Reed, Michael Armstrong (a Chemistry and Materials Science postdoctoral researcher) and researchers from Los Alamos National Laboratory (LANL) will collaborate on the project, which will be conducted at LANL experimental facilities.

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